High Blood Cholesterol

Definition: Cholesterol is a type of fat found in the diet and carried in the bloodstream in lipoproteins. Cholesterol screening is accomplished through a blood test which measures the level of lipoproteins in the blood. High blood cholesterol is a level of total cholesterol (all lipoproteins) above 240mg/dL for adults or 200mg/dL for children.

Summary

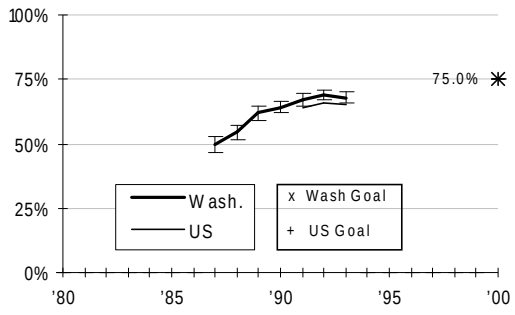
About 20 percent of heart disease deaths are attributable to high blood cholesterol. High blood cholesterol levels are a risk factor for atherosclerosis, which may lead to coronary heart disease and stroke. A high intake of fat, particularly saturated fat and cholesterol, can cause elevated blood cholesterol.

Screening for high blood cholesterol, with appropriate follow-up and clinical management, is an important component of heart disease prevention. Improvements in cholesterol screening and control can be achieved through public and professional education, health care policy change and community-based interventions.

Time Trends

Rates for high blood cholesterol screening have risen substantially since the inception of the National Cholesterol Education Program (NCEP) in 1987.[1] The 1995 national Cholesterol Awareness Survey found that 75% of adults reported having had their cholesterol checked, compared to 65% in 1990.[2] Washington State data for 1987 to 1993 on reported cholesterol screening within the previous five years reveal a similar improving trend.

Blood Cholesterol Screening
Percent of adults having cholesterol checked in previous five years



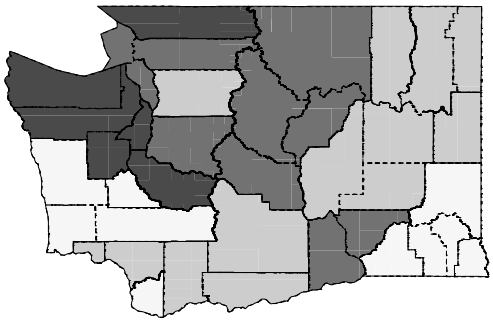
The mean cholesterol level of adults aged 20-74 in the United States fell from 213 mg/dL in 1978 to 205 mg/dL in 1990, a 4% decline. During this time, the proportion of adults with blood cholesterol levels over 240 mg/dL decreased from 26 to 20 percent. However, 31% of American adults had elevated blood cholesterol levels between 200 and 240 mg/dL, which is considered borderline high. Thus, a total of 51% of adults have cholesterol levels above the recommended level.[3] State data on the proportion of the population with elevated blood cholesterol levels are not available.

Year 2000 Goal

For cholesterol screening, the goal is to increase the proportion of the Washington State population that has been screened to 75%. In 1993, the most recent year for which data are available, 68% (±2) of Washington adults reported having had their cholesterol checked in the previous five years.

A related national goal is to increase to at least 60% the proportion of adults with high blood

Adults Tested for Blood Cholesterol
Percentage by Region, 1991-1993



Percentage Tested
61.7 to 64.9
65.0 to 67.9
68.0 to 69.9
70.0 to 75.8

State Average: 68.0 %
National Rate: NA

cholesterol who are aware of their condition. In 1988 this proportion was estimated at 30%. Another relevant national goal is to reduce the mean serum cholesterol level among adults to no more than 200 mg/dL. National data from 1990 indicate that the national mean was 205 mg/dL. No comparable data are available for Washington State.

A national Year 2000 goal related to the achievement of blood cholesterol target levels is to increase to at least 75% the proportion of primary care providers who initiate diet and, if necessary, drug therapy at levels of blood cholesterol consistent with current management guidelines for patients with high blood cholesterol. No baseline data about health care provider practices exist for Washington.

Geographic Variation

Variations in reported cholesterol screening by region for 1991-1993 are displayed on the previous page. Reported screening was lowest in the region comprised of Asotin, Columbia, Garfield, Walla Walla and Whitman Counties, at 61.7% (±7.4). The highest screening rate, 75.8% (±6.6), was found in Whatcom County. These differences are not statistically significant, however.

Age and Gender

Young adults are much less likely to report having their cholesterol checked than older people. In 1993, 36.5% (±6.6) of individuals age 18-24 reported screening, compared with 85.6% (±3.5) of adults over age 55. Women more often reported cholesterol screening (72.6% ±2.6) than men (63.1% ±3).

The proportion of people with elevated cholesterol levels in the United States increases with age. Cholesterol levels are slightly higher among men, and levels tend to rise later in life for women. Men experience an increased likelihood of developing elevated cholesterol and atherosclerosis after age 45. The risk of developing coronary heart disease increases for women after age 55, or at the onset of menopause. This is mitigated for women if estrogen replacement therapy is provided.

Race and Ethnicity

Data limitations prevent the evaluation of cholesterol screening rates for individual racial and ethnic groups in Washington. Among all non-Caucasians surveyed in 1993 combined, 57.3% (±6.2) reported cholesterol screening, compared with 69% (±2.1) among Caucasians.

Cholesterol levels vary throughout the world. When people move from countries with low cholesterol levels and low fat diets to the US and become acculturated to American eating patterns, their cholesterol levels rise to resemble those of people born in the US.

Income and Education

Washington survey data for 1993 show a lower proportion of individuals with annual household incomes of less than $20,000 reporting cholesterol screening (57.8 ±4.2) than is the case for more affluent individuals (71.8 ±2.3). A similar association is seen for educational attainment. Only 55.2% (±7.1) of people without a high school diploma reported receiving screening, compared with 73.6% (±2.4) of people with more than high school education.

Health Effects

A high blood cholesterol level is defined as 240 mg/dL or above for adults and 200 mg/dL or above for children. Borderline high values are 200-240 for adults and 170 to 200 for children. These levels are associated with significant adverse health effects.

Coronary heart disease. High blood cholesterol levels are an independent risk factor for atherosclerosis and coronary heart disease (CHD). A total cholesterol of 240 mg/dL doubles the risk for CHD compared to a level of 200 mg/dL. Borderline levels result in intermediate risk and risk increases steeply at levels above 240.[4] Cholesterol-related CHD risk decreases at levels below 200, as well. Overall, a 1% reduction in total cholesterol is expected to result in an average 3-4% decrease in the risk for CHD.[5] Total blood cholesterol levels include several types of lipoprotein, two of which are of interest in public health. High levels of Low Density Lipoprotein (LDL) cholesterol increase risk for coronary heart disease. The reverse is true for high levels of High Density Lipoprotein (HDL) cholesterol, which are protective, whole low HDL levels increase risk.

Stroke. High blood cholesterol levels are probably an independent risk factor for ischemic strokes. However, the effect of lowering

cholesterol on the risk for stroke needs further study.[6]

Associated Factors, Conditions, and Outcomes

High fat diet . A diet high in total fat and saturated fat is probably the most important factor associated with increased cholesterol levels in the general population. Dietary modification is often effective in lowering blood cholesterol levels.

Genetic Factors and Family history. Elevated blood cholesterol levels are mediated by genetic factors. Genetic disorders in cholesterol transport or metabolism can result in markedly elevated LDL levels and substantially increased CHD risk. People with a family history of early heart disease in a close relative and a high blood cholesterol level, in the absence of a specific genetic syndrome, also have increased CHD risk.[7]

Persons at high risk for developing coronary heart disease. The presence of two or more coronary heart disease risk factors (including family history of CHD, high blood pressure, and cigarette smoking) places an individual at increased risk for developing atherosclerosis and CHD as result of elevated blood cholesterol.

Smoking and Physical Inactivity. Exposure to tobacco smoke and physical inactivity are both associated with lower HDL cholesterol levels and thus increase cholesterol-related CHD risk.

Alcohol Use. Alcohol consumption is associated with increased HDL cholesterol levels but, due to other adverse health effects, is not recommended as a method of raising these levels. Alcohol use also contributes to hypertension, another risk factor for atherosclerosis.

Obesity. Being overweight is associated with increased LDL and decreased HDL cholesterol levels. Body Mass Index (BMI) is positively correlated with total cholesterol levels.

Groups of Particular Interest

Certain medical conditions identify groups of people at particularly high risk for increased morbidity and mortality from coronary heart disease associated with high blood cholesterol levels.

Familial forms of hyperlipidemia. Genetically determined high risk groups with inherited defects in lipid metabolism.[8] While familial hypercholesterolemia is uncommon, it results in early onset of atherosclerosis and severe premature heart disease with greatly increased mortality rates. Early aggressive screening efforts for adults, children and close relatives of persons known to have this disorder are recommended.

Known coronary heart disease, previous stroke, or other atherosclerotic disease. Individuals with these conditions are candidates for aggressive management of high blood cholesterol and are the group who will most often receive drug therapy in addition to lifestyle change therapies. Recent research has shown that management of high blood cholesterol levels in this population significantly decreases the incidence of recurrent events and reduces overall morbidity and mortality.[9]

Intervention Points, Strategies and Effectiveness

Screening and Early Detection. All adults 20 years of age and older should have their total cholesterol and HDL checked at least once every 5 years per NCEP guidelines. While universal screening of children is not recommended, testing may be indicated if specific risk factors or a positive family history are present.[10] Cholesterol screening alone does not produce behavior change, however. For long term reduction of CHD risk, appropriate education, counseling and medical follow up must accompany cholesterol screening to result in lower cholesterol levels.[11]

Clinical Care. Cholesterol lowering has been demonstrated to decrease morbidity and mortality from CHD. People with known coronary heart disease or other atherosclerotic disease receive the most immediate benefit from cholesterol lowering.[12] In general, according to NCEP guidelines, dietary and physical activity interventions, along with smoking cessation, represent the first line of treatment. Drug therapy is reserved for patients with known heart or other atherosclerotic disease and other high risk groups.

While physician adherence to cholesterol management guidelines has improved in recent years, much work remains to be done optimize the care of people with elevated blood cholesterol. The implementation of clinical practice guidelines and changes in medical care reimbursement policies and in health care system organization are all parts of the current, rapidly changing health care landscape. These changes have the potential

to support the development of efficient systems for the delivery of effective clinical preventive care.[13]

Population Based Interventions. Population-based strategies have focused on a combination of cholesterol screening with community education and environmental change strategies to reduce dietary fat intake and increase physical activity. Studies of data from community-based cholesterol control programs have shown mixed results. It has been difficult to separate the secular trends in society from the specific effects of population-based nutrition interventions on cholesterol levels.[14] Additional study is needed regarding the implementation of cost-effective community-based programs, especially among high risk and underserved populations

See related sections on Coronary Heart Disease, Diabetes, Nutrition, Physical Inactivity and Stroke

Data Sources

State survey data: Washington State Department of Health. Behavioral Risk Factor Surveillance System (BRFSS).

National survey data: National Health Interview Survey (NHIS) and National Health and Nutrition Examination Survey (NHANES III), National Center for Health Statistics.

For More Information

Washington Department of Health, Heart Health Program (360) 586-6091.

Washington Department of Health. Washington State Heart Disease and Stroke Prevention Plan. WSDOH, Olympia, WA. 1995.

Endnotes:

[1] US National Heart, Lung and Blood Institute, National Cholesterol Education Program. Report of the Expert Panel on Population Strategies for Blood Cholesterol Reduction. US Department of Health and Human Services, National Institutes of Health. NIH No. 90-3046, November 1990

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[11] Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults. Summary Second Report of the of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel II). J Am Med Assoc. 1993;269(23):3015-3023.

[12] Ibid.

[13] Washington State Department of Health. Refining Methods for Measuring and Improving Health Care Quality. WSDOH, Olympia, WA 1995.

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